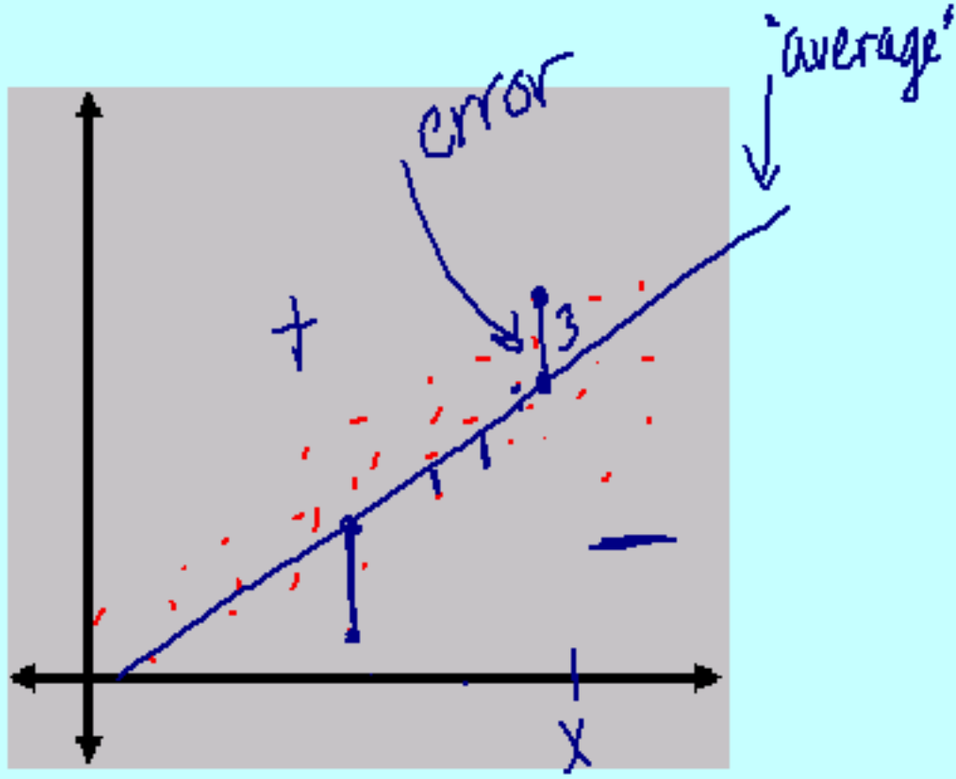
**Chapter 2** section 3 **Line of Best Fit**

errors = actual y − predicted y

From line

$\Sigma$ + errors = $\Sigma$ − errors




**Linear Regression Line:**

- straight line
- **Describes how...** a response variable (y) changes as an explanatory variable (x) changes
- **Used to ...** predict the value of y for a given value of x
- **Requires that...** there is an explan. and resp. variable

**Most accurate Regression line:**

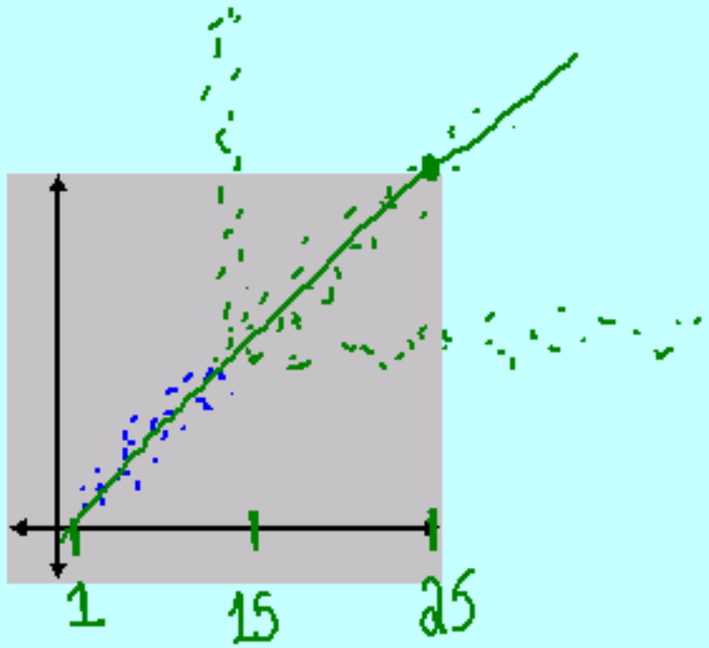
- Called: **Least Squares Regression line (LSR line)**
- Definition: minimizes… **the errors (in the y direction)**
- Form: $\hat{y} = a + bx$ … $y = mx + b$ (sample; int.; slope)
- Pieces:
  - b = slope = $r\left(\frac{S_y}{S_x}\right)$ AP Formula Sheet $b_1 = r\left(\frac{S_y}{S_x}\right)$
  - a = int = $\bar{y} - b\bar{x}$ $b_0 = \bar{y} - b_1\bar{x}$
- always … **passes thru $(\bar{x}, \bar{y})$**
- not **resistant (the mean is in the formula)**
- on calculator: * **STAT -> CALC -> 8:LinReg(a+bx) -> ENTER**
  * **LinReg(a+bx) x-list, y-list, Y1**
  * **Y1 is found at: VARS -> Y-VARS -> 1:Function -> 1:Y1 -> ENTER**

Corr { r = ; $S_y$ = ; $S_x$ = ; $\bar{x}$ = ; $\bar{y}$ = }

**Vocab:**

**Extrapolation-**

- using an x-value that's far outside of our sample




- Predicting using LSR line

* not trustworthy

**Coefficient of determination**

**symbol:** $r^2$

**calculation:** square corr (r)

**sentence interpretation:**

r² % of the change in y-variable that is due to the change in the x-variable.

**Example:**

$r \approx 0.5$ ← #

$r^2 \approx 0.25$ ← %

**Example:**
**Airfares worksheet**
**r = 0.795**
**$r^2$ =** 0.632

**Interpretation:**

63.2% of the change in airfare is due to the change in distance traveled.

**other factors:**

36.8%

airline popularity
seat service
capacity

Interpret slope:

$$\frac{\Delta y}{\Delta x} = \frac{\$0.1174}{1 \text{ miles}} \rightarrow \$11.74$$

For every 1 mile, the airfare increases by $0.12.

# Section 2.4

$\hat{y} = 83.267 + 0.1174(370)$

$\hat{y} = \$126.70$

$41(370)$ $\quad 2842$

$138 - 126.70 = 11.30$

$258 - 259.56 =$